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EARTH ORBIT LASER SYSTEMS

216-89

Ja H. Lee

LaRC

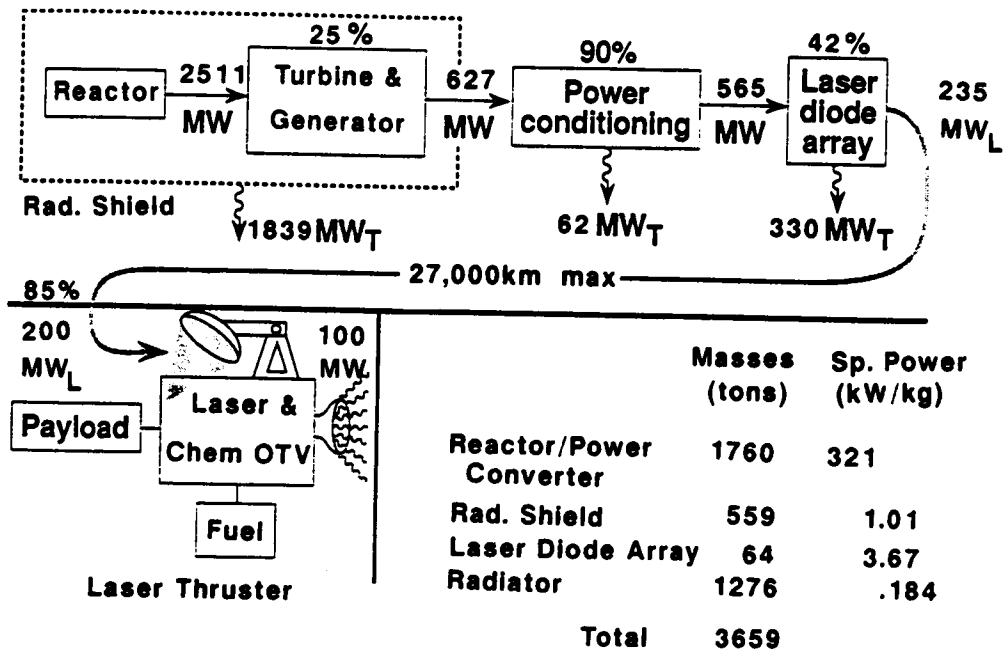
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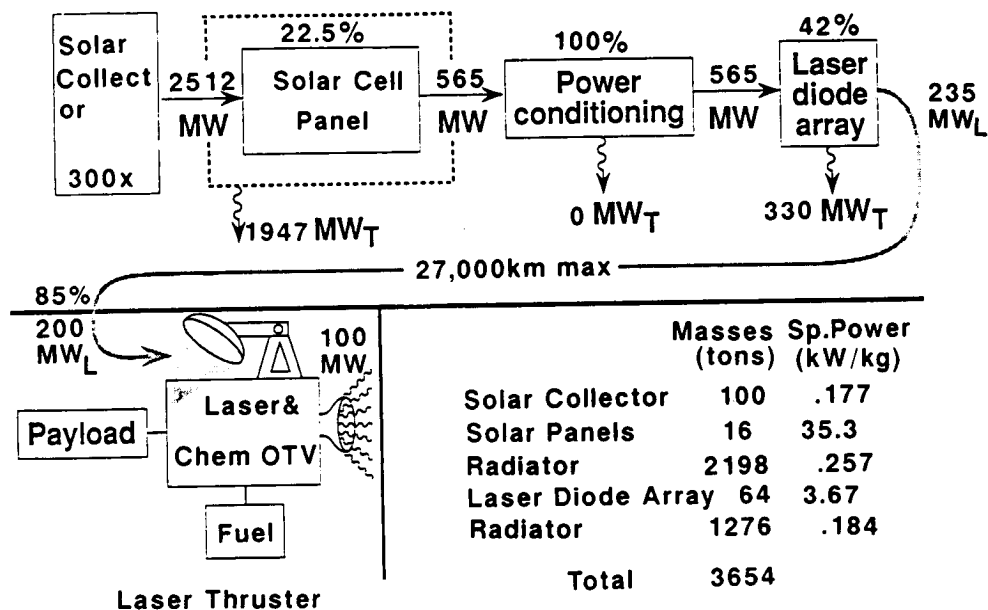
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- Provide 50 ~ 500-MW laser powers for 25 ~ 250-MW thrusters
- Placed on 6,300-km earth orbit for power beaming to laser OTV's
- Laser system options
  - a) Electrically pumped lasers
    - Nuclear reactor driven diode laser amplifier array
    - Solar panel driven diode laser amplifier array
    - Other electric discharge lasers are considered but discarded a priori
  - b) Direct solar-pumped lasers
    - Iodine photodissociation laser
    - Solid-state lasers
    - Liquid lasers

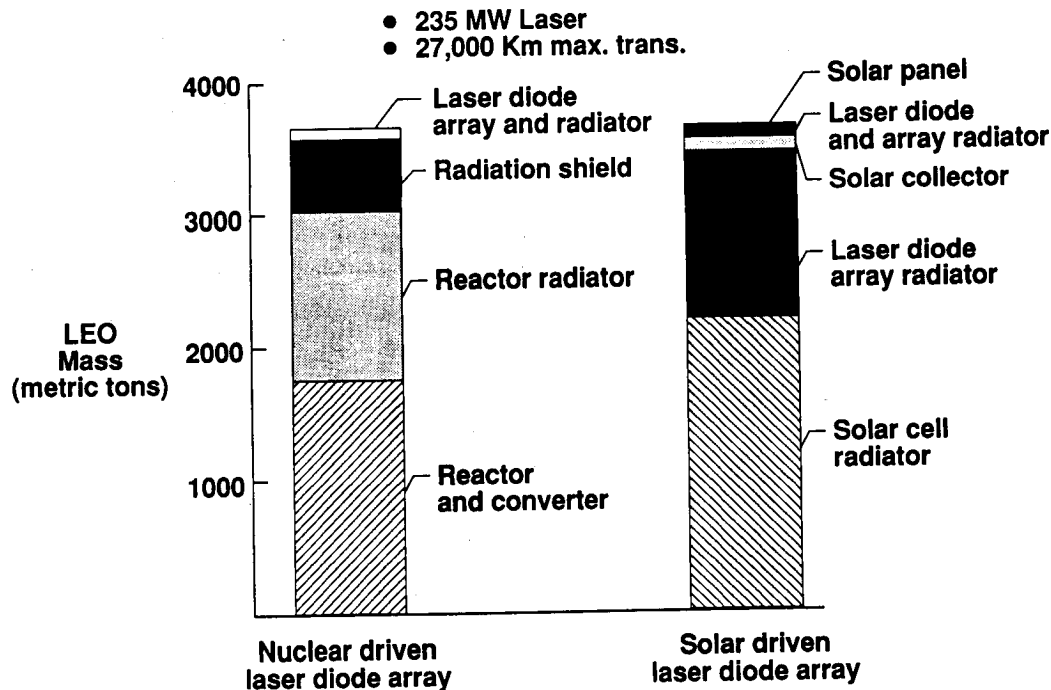
## REACTOR DRIVEN LASER POWER TRANSMITTER FOR LEO-TO-LLO OTV



# SOLAR DRIVEN LASER POWER TRANSMITTER FOR LEO-TO-LLO OTV

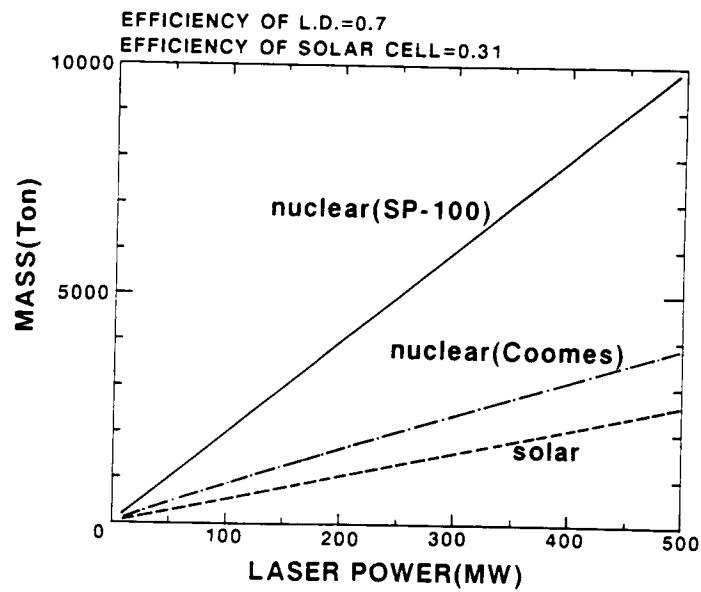
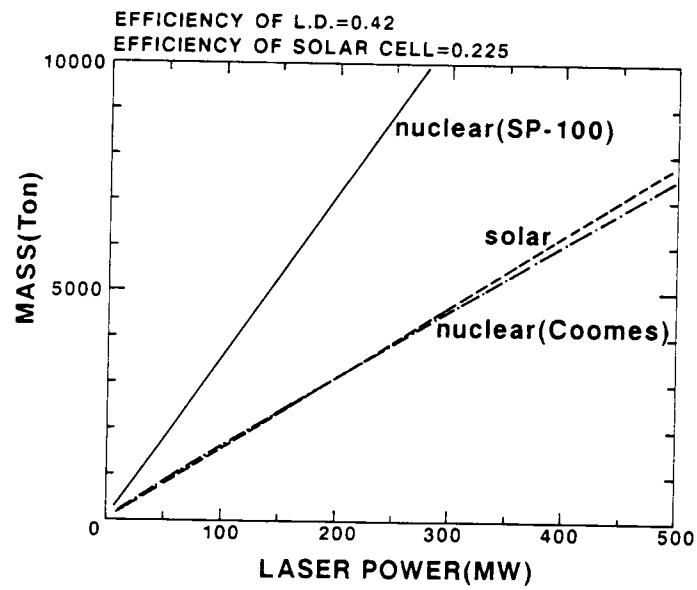


## LASER SYSTEMS FOR PROPULSION

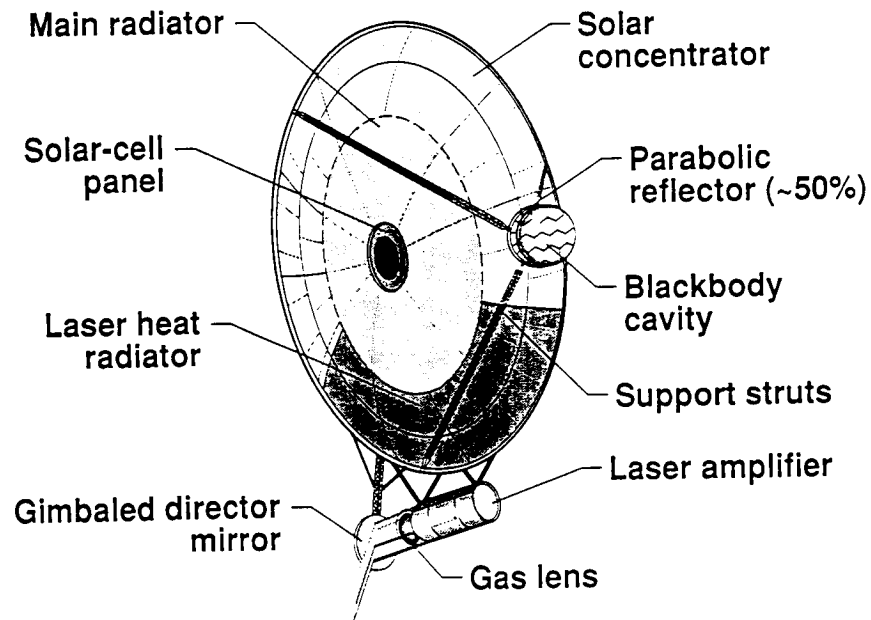


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# TRANSMITTER MASS VS LASER POWER



## SOLAR DRIVEN LASER POWER TRANSMITTER



### SUMMARY

- At the state-of-the-art efficiencies, both nuclear and solar-driven systems require equal masses for the same laser powers in the 50-500 MW range, typically 3,700 tons for a 100-MW thruster.
- Future efficiency improvement of solar panel and laser diode array will realize significant reduction (by a factor of 3) in system masses.
- Beaming time for laser propulsion is relatively short and other missions should be considered for increasing the system duty cycle.